CHALLENGES IN URBAN METEOROLOGY: A FORUM FOR USERS AND PROVIDERS

1. **Purpose:** To provide a summary of the forum, *Challenges in Urban Meteorology: A Forum for Users and Providers*, which was hosted by Mr. Samuel P. Williamson, Federal Coordinator for Meteorology, and the Department of Homeland Security's Science and Technology Directorate, September 21-23, 2004, in Rockville, Maryland. The theme of the forum was: *Information to Improve Community Responses to Urban Atmospheric Hazards, Weather Events, and Climate*. The over 150 participants represented the Federal agencies, the academic and private sectors, the media, and a broad range of both providers and users of weather information from urban communities across the Nation. The forum focused on identifying users' issues and needs in five priority areas: severe weather, homeland security, air quality, water quality, and climate.

2. **Background:** In September 1998, urban meteorology was identified as a priority and approved by the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) as a high pay off, crosscutting issue for the 21st century. In October 2002, FCMSSR, chaired by VADM Lautenbacher, supported the need for an interagency forum on urban meteorology that would address the current state of the science and identify future research and development needs and requirements. In the past, the emphasis in the urban zone was placed on air quality and pollution and their related health effects. The events of 9/11 and the recent increase in landfalling hurricanes are examples of events that have sensitized our Nation to the full range of impacts that weather and climate can have on urban areas and helped establish the framework for this forum.

3. **Objectives:**
   - Identify better ways to integrate, apply, and deliver weather and climate science and technology to urban decision makers and reduce high impact weather and climate risk
   - Focus attention on the relationship of natural hazards to urban ecosystems and their management and facilitate the transfer of emerging science and technology
   - Promote close collaboration and integration of multidisciplinary research to address weather and climate impacts on urban communities and improve forecasting for coastal and complex terrain areas
   - Raise the level of concern on priorities needed for funding research and application of science and technology on urban weather and climate problems/issues

4. **Key Events:**
   - **Dr. Kathie L. Olsen**, Associate Director for Science, Office of Science and Technology Policy (OSTP), provided the opening session's keynote address. The role of OSTP is to advise the President and Offices of the President, and to lead the interagency effort to develop science and technology policies and budgets for all areas of science. Dr. Olsen spoke on the policy, science, and partnership issues for the complex urban environment. As an introduction, she stated that the United Nations has predicted that by 2025, 60 percent of the world's population will live in cities. As a result, we need to understand the hazards in the urban environment; we need to be warned and know how to react; we need to be safe at home and at work; and we need to recover quickly. Dr. Olsen further stated that OSTP R&D priorities for FY06 and beyond reflect the changing needs of the urban zone and include the environment, biology of complex systems, physical sciences, homeland security, networking and information technology, and nanotechnology.

- **Dr. James R. Mahoney**, Assistant Secretary of Commerce for Oceans and Atmosphere and NOAA Deputy Administrator, provided the luncheon address on Wednesday. During his talk, Dr. Mahoney stressed that we need to find a system solution if we are to deliver the improved weather and climate services required by urban leaders and managers. We must identify the problems we are trying to solve within the context of the whole urban system we support and then optimize the solution. The issues in the urban zone where NOAA will play a clear leadership role include model development, measurement data quality, and urban test beds.
- Invited Presentations (Tuesday, 21 Sep 04):
  - **Ms. Nancy Suski**, Director, Emergency Preparedness and Response Portfolio, Science and Technology Directorate, Department of Homeland Security (DHS), summarized the urban meteorology requirements for homeland security into four categories: wide-area monitoring; system studies, capitalizing on modeling and simulation; incident characterization and response strategies; and validation/field demonstrations.
  - **Mr. Eric Webster**, Majority Staff Director, House Science Subcommittee on Environment, Technology and Standards, then followed with a look at how Congress views all requests for increased funding. He challenged the audience to develop a concise end-to-end story of what would be the most cost-effective actions to take in the area of urban meteorology…better science, better public education, better preparation, etc. Where would the Nation get the "biggest bang for the buck" in improving urban meteorology?
  - **Dr. Ronald D. McPherson**, Former Executive Director, American Meteorological Society, provided his perspectives on the interdisciplinary scope and approaches to urban meteorology. In his view, the interdisciplinary nature of urban meteorology makes it difficult to get your arms around, and we need to do a better job of communicating both within and outside the scientific community on the challenges this important area poses.
  - **Dr. Gilbert Brunet,** Meteorological Research Branch, Meteorological Services of Canada, provided an update on Canadian efforts to use models on several scales to handle the public's urban meteorology forecast and warning needs.
- Invited Presentations (Thursday, 23 Sep 04):
  - **Mr. Dave Jones**, Founder, President & CEO, StormCenter Communications, Inc., and President, Foundation for Earth Science, discussed the issue of raising the environmental I.Q. of America and suggested ways to address it. First, we need to apply environmental science in such a way as to engage Americans to increase their understanding of the environment. Secondly, we must effectively use science information as a tool for improved public and agency decision making. Thirdly, we need to directly relate science to societal benefits, and finally, we need to increase public environmental awareness so better decision making can be made in times of crisis.
  - **Dr. Richard D. Rosen**, Assistant Administrator, Office of Oceanic and Atmospheric Research, NOAA, highlighted three important points: (1) while the need for an urban focus was magnified by the 9/11 attacks, there are long-standing issues regarding health and safety in the urban zone that will continue to demand attention; (2) the need for new observing systems and improved models in the urban environment will guide future research; and (3) the complexity of urban meteorology issues demands that NOAA partner with the broader community to advance research and development.

- **Ms. Chris Elfring**, Director, Board on Atmospheric Sciences and Climate, National Academy of Sciences, provided comments focused on the challenges in making weather and climate information useful in decision making. To improve our abilities in this area, she highlighted the need to understand our research challenges (things we need to understand better) and "usefulness" challenges (things we need to do better to increase the impact of what we know).

5. **Summary/Recommendations:**
   - The forum was designed and successfully achieved its efforts to:
     - Bring representatives from both the operational and research communities together to provide input on the key issues in developing a coherent end-to-end urban meteorology program.
     - Begin to address the needs of the Federal agencies and user communities that have a stake in urban meteorology.
   - **Follow-on Goal:** To develop a comprehensive interagency document that will:
     - Provide support for individual agency urban meteorology operational and research requirements in the planning, programming, and budgeting process
     - Provide a set of coordinated priorities to facilitate interagency partnering, collaboration, and leveraging, regarding urban meteorology issues
     - Serve as an education and outreach tool to advertise the urban meteorology program as a vital interagency program
     - Focus on an end-to-end ecosystem approach to urban meteorology issues and challenges
     - Emphasize impact to society (in cost/benefit terms)
   - The document at a minimum would:
     - Document already accomplished success stories, with a focus on the results of those successes and how they enhance the required operational capability
     - Define users' needs from both a scientific perspective and the end-user (e.g., emergency manager, city planner, etc.) perspective with links to the socioeconomic benefits of the improvements in capability that would meet the defined needs
     - Define the overarching operational capability needed with regard to severe weather, homeland security, air and water quality, and climate
     - Conduct a baseline assessment (with inputs from all the Federal agencies), to include near-term projects and initiatives already on the books
     - Define the gaps in our knowledge and capability that will require additional research to allow us to achieve our desired operational capability and develop a plan of action to address those gaps

6. **Next Steps:**
   - OFCM will form and sponsor an interagency working group to coordinate and develop the interagency document discussed above, to include identifying organizational responsibilities and addressing the following crosscutting issues:
     - Regional ecosystems planning and management
     - Urban observations
     - Research and technology
     - Urban modeling
     - Information dissemination
     - Education, outreach, and training

    - Business continuity planning
- Make urban meteorology an agenda item at the upcoming ICMSSR and FCMSSR meetings in October 2004 and November 2004, respectively

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